

CHAPTER-6

**IMPACT OF
AGRICULTURAL INPUTS
ON AGRICULTURE
PRODUCTION IN
HARYANA**

CHAPTER-6

IMPACT OF AGRICULTURAL INPUTS ON AGRICULTURE PRODUCTION IN HARYANA

6.1) Introduction

In this chapter is an attempt to analyse the impact of agricultural inputs on agricultural production. Agricultural growth is based on progress of agricultural inputs like, HYV seeds, fertilizer consumption, pesticides, rainfall, tractors and irrigation in Haryana. Fertilizers are manufactured mixtures of chemical products it includes Nitrogen (N), Phosphorus (P) and Potassium (K). This chapter divided in two sections: the first section showed impact of agricultural inputs on agricultural production in Haryana. The second section checked the multicollinearity in agricultural inputs. To fulfil the objective multiple linear regression model has been used.

6.2) Multiple Linear Regression Model

It shows relationship the between a dependent variable and two or more explanatory variables. To estimate the influence of agriculture factors on agriculture production, the multiple linear regression analysis by Ordinary Least Square (OLS) estimation has been used. The functional form of multiple linear regression models is given below:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu_i$$

Where,

Y_i = Dependent Variable- Agriculture production of selected food grain crops

α = is the constant or intercept

(X_1, \dots, X_5) are Independent Variables

X_1 = Irrigation, X_2 = Fertilizer, X_3 = Pesticides, X_4 = Rainfall, X_5 = Tractors

α = Intercept, β_1 = is the slope (beta coefficient) for X_1 ,

Table 6.1.1 Impact of agricultural inputs on total production in northern zone of Haryana				
Dependent Variable: Agricultural production			R-square	0.89
Variables	Coefficient	Standard. Error	T - Statistic	Prob.
Irrigations	2.250	2.371	1.037	0.228
Fertilizers	0.002	0.001	-1.371	0.235
Pesticides	1.741	0.970	1.383	0.132
Rainfall	2.018	1.977	1.795	0.354
Tractors	0.140	0.045	1.021	0.025
Source: Researcher Calculation				

The table 6.1.1 showed impact of agriculture inputs on total production in northern zone during the year 2001-02 to 2014-15. In this table, Agriculture production is dependent variable and fertilizer, rainfall, irrigations, pesticides and tractors are independent variables. R-squared showed total production is 89 per cent depend on inputs. P – Value of irrigations, fertilizer, pesticides, rainfall, and tractors are showed total production depending on irrigations, fertilizer, pesticides, rainfall, and tractors with 22%, 23 %, 13 %, 35% and 02 % respectively. Total production is highly dependent on rainfall in northern zone during the period.

Table 6.1.2 Impact of agricultural inputs on total production in central –zone of Haryana				
Dependent Variable: Agricultural production			R-square	0.78
Variables	Coefficient	Standard. Error	T - Statistic	Prob.
Irrigations	1.250	2.371	1.371	0.106
Fertilizers	0.002	0.001	1.383	0.482
Pesticides	1.741	0.970	1.795	0.230
Rainfall	2.018	1.977	1.021	0.391
Tractors	0.140	0.045	3.132	0.257
Source: Researcher Calculation				

Table 6.1.2 shows impact of agricultural inputs on total production in central zone during the year 2001-02 to 2014-15. In this table, R-squared value showed that total production was depend 78 percent on inputs. P-value showed it depends on irrigations, fertilizer, pesticides, rainfall, and tractors with (10, 48, 23, 39 and 25) percent. Total production is highly dependent on fertilizer in central zone during the period. Standard error and t- value showed that model is significant.

The table 6.1.3 shows impact of agricultural factor on total production in western zone during the year 2001-02 to 2014-15. In this table, R-squared value is 0.93 which showed total production was depend 93 per cent on inputs. Total production was depending on 29 percent on rainfall, whereas 47 percent depend on pesticides. It was 04, and 10 percent depend on fertilizer, and tractors respectively. Standard error and t- value showed significant impact of inputs in this zone.

Table 6.1.3 Impact of agricultural inputs on total production in western zone of Haryana				
Dependent Variable: Agricultural production			R-square	0.93
Variables	Coefficient	Standard. Error	T - Statistic	Prob.
Irrigations	15.551	07.512	02.070	0.10
Fertilizers	00.015	00.006	02.706	0.04
Pesticides	00.931	01.195	00.779	0.47
Rainfall	12.293	10.630	01.156	0.29
Tractors	00.118	00.056	02.082	0.10
Source: Researcher Calculation				

Table 6.1.4 shows impact of agriculture inputs on total production in southern zone during the year 2001-02 to 2014-15. Total production is 80 % depend on agriculture inputs. P - Value of irrigations, fertilizer, pesticides, rainfall and tractors are (0.01, 0.17, 0.14, 0.10 and 0.15). Total production is highly dependent on fertilizer and lowest on irrigations in southern zone during the period.

Table 6.1.4 Impact of agricultural inputs on total production in southern zone in Haryana

Dependent Variable: Agricultural production			R-squared	0.80
Variable	Coefficient	Standard. Error	T - Statistic	Prob.
Irrigations	17.053	4.088	4.172	0.011
Fertilizers	0.015	0.010	1.567	0.177
Pesticides	-3.430	1.986	-1.727	0.144
Rainfall	-4.896	2.472	-1.981	0.104
Tractors	0.041	0.250	-1.687	0.152
Source: Researcher Calculation				

Table 6.2.1 Multicollinearity in Impact of agricultural inputs on total production in northern zone of Haryana

Model	Unstandardized Coefficients		Standardized Coefficients	T- value	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-2447.060	2359.479		-01.037	00.347		
Irrigation	02.250	02.371	-00.294	01.371	00.229	00.456	02.193
Fertilizer	00.002	00.001	00.233	01.383	00.225	00.743	01.347
Pesticides	01.741	00.970	00.401	01.795	00.133	00.421	02.374
Rainfall	02.018	01.977	00.214	01.021	00.354	00.481	02.083
Tractors	00.140	00.045	00.571	03.132	00.026	00.633	01.580
Source: Researcher Calculation							

The table 6.2.1 checked multicollinearity in northern zone of Haryana. In this table VIF value is less than 10, and tolerance value is less than 1, which shows there is not multicollinearity in dependent variables.

Table 6.2.2 Multicollinearity in Impact of agricultural inputs on total production in central zone of Haryana

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Standard Error	Beta	T- value	Sig.	Tolerance	VIF
(Constant)	-3526.060	2131.479		-01.655	00.137		
Irrigation	01.250	02.371	-00.294	01.371	00.029	00.716	01.397
Fertilizer	00.002	00.001	00.233	01.383	00.225	00.743	01.126
Pesticides	01.741	00.970	00.401	01.795	00.203	00.524	01.907
Rainfall	02.018	01.977	00.214	01.021	00.354	00.616	01.623
Tractors	00.140	00.045	00.571	03.132	00.026	00.709	01.411

Source: Researcher Calculation

Table 6.2.3 Multicollinearity in Impact of agricultural inputs on total production in western zone of Haryana

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Standard. Error	Beta	T- value	Sig.	Tolerance	VIF
(Constant)	9823.296	6252.135		01.571	00.177		
Irrigation	15.551	07.512	00.414	02.070	00.093	00.308	03.242
Fertilizer	00.015	00.006	00.608	02.706	00.042	00.245	04.080
Pesticides	00.931	01.195	00.163	00.779	00.470	00.285	03.535
Rainfall	12.293	10.630	00.238	01.156	00.300	00.292	03.430
Tractors	00.118	00.056	00.481	02.082	00.092	00.232	04.319

Source: Researcher Calculation

The table 6.2.3 checked multicollinearity in western zone of Haryana. In this table VIF value are 3.242, 4.080 3.535, 3.430 and 4.319 of irrigations, fertilizer, pesticides rainfall and tractors which showed not multicollinearity. Tolerance value also showed not multicollinearity in explanatory variables in this zone.

Table 6.2.4 Multicollinearity in Impact of agricultural inputs on total production in Southern zone of Haryana

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Standard. Error	Beta	T-value	Sig.	Tolerance	VIF
(Constant)	462.249	301.005		00.153	00.884		
Irrigation	17.053	04.088	00.943	04.172	00.009	00.749	01.336
Fertilizer	00.015	00.010	-00.830	01.567	00.178	00.136	07.344
Pesticides	-03.430	01.986	-00.943	-01.727	00.145	00.128	07.791
Rainfall	-04.896	02.472	-00.665	-01.981	00.104	00.339	02.949
Tractors	00.41	00.25	00.373	-01.687	00.152	00.780	01.281

Source: Researcher Calculation

The table 6.2.4 checked multicollinearity in western zone of Haryana. In this table VIF value are 1.336, 7.344, 7.791, 2.949 and 1.281 of irrigations, fertilizer, pesticides rainfall and tractors which showed not multicollinearity. Tolerance value also showed not multicollinearity in explanatory variables in this zone.

Conclusion

This chapter was an attempt to study the impact of agricultural inputs on agricultural production. For the purpose the multiple regression model was applied. On the base of its finding it is concluded that

- Total production is highly dependent on rainfall in northern zone whereas in central zone it's depending on fertilizer during the period.
- Total production is dependent on pesticides, fertilizer, and tractors with 47, 04, 27 and 10 percent in western zone.
- It is highly dependent on fertilizer in southern zone during the period.